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Introduction

A few years ago a husband who was a brilliant surgeon and his beautiful, talented wife, a writer, entered my office. The husband said, "My wife has difficulty understanding lectures in her classes. She had her hearing tested. Her hearing is perfect. She went for neuropsychological testing and report says she doesn't understand what she hears. Look at her! She is extremely intelligent. She has written several books. How is that possible?"

Hearing and understanding are two very different concepts. Watching an intelligent individual have difficulty completing "simple" tasks is bewildering. Comprehension and learning are fascinating processes, aren't they?

How does learning happen? This question has been studied for years, and the scientific community is as much awed by the

answer as it is confused. Learning or the lack of it is due to a confluence of factors, many of them nebulous. *And*, the factors are multifaceted.

Learning is individualized, and we give others clues as to how the process works for us. We make comments like, "I see what you mean." or, "I hear you." or, "I need to read this in order to understand it." What happens when someone who prefers hearing teaches someone who prefers seeing?

To be effective, teacher and student need to communicate using an agreed on modality. Often the teacher's resistance to using other modalities involves the *teacher's* difficulty in changing styles. Multimodal presentations allow students to access material in the modality they find most comfortable. This is a difficult albeit fundamental concept.

When I decided to create a document on learning, I realized giving individuals the opportunity to review the material in written form after a short presentation was critical. Ah ha! ***The aural and visual presentation of complex voluminous material must be supplemented by other sources to enhance the opportunity for learning.***

Certainly this concept is not new to teachers.

This site allows for some awesome links to brain mapping and other interesting complimentary material. What a fascinating opportunity internet access brings to a document! (All of the credit for this facet of the document goes to the Mrs. Gerry Light and her students.)

So as you progress through this document, I hope you will gain a better appreciation for what you are doing as a teaching and learner, as we are all learners. Enhancing, augmenting, and complementing your understanding, which leads to questioning, reorganizing, recapitulating and rethinking... And so I want to thank everyone who has helped to get this document in its final form. I especially want to acknowledge

John Keenan and Joseph Glacken for their tireless work. And for Ray Shay and the computer staff who patiently reframed it for the website. Otherwise I would still be expanding, rehashing, searching, analyzing, restructuring and revising.

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Abstract

This document explains the essence of the learning process and the difficulties that may occur during that process. The document is written so that you can go directly to a section without reading the previous material.

The material is meant to be readable by the general public, although there are some sections that explain cortical function and its relationship to specific skills.

The document is divided into several sections. Clicking on the section you want to read will bring you directly to that area. For example, teachers may find the section "Interesting Points" important for identifying how students learn. For individuals who are looking for a more technical explanation, there are a number of interesting links to the internet which give information related to cortical processing. If you are interested in finding out basic information about the differences between attentional problems and learning disabilities or the criteria for diagnosis, then you can go directly to those sections.

Individuals interested in learning about getting accommodations for standardized testing can explore **Guidelines** at the end of this document. These pages explain the tests necessary for diagnosis of Attention Disorders and Learning Disorders according to the criteria established by ETS and many colleges.

I. **Discrepancy = Underachievement**

A. Discrepancy - a difference between two things. With a learning disability there needs to be a 2 Standard deviation difference between ability and achievement.

B. Ability - what you are able to do. In learning this is measured by the IQ test. The strict average on IQ is 100. The range of average is 90 – 109. Normal IQ then is considered within a range of 90-109. With the WAIS, 15 points is a standard deviation. The Stanford Binet has a 16 point standard deviation; it measures IQ scores that are in the extremes with more accuracy.

C. What kinds of things are measured on aptitude tests?

On the **Wechsler** the subtests are divided into **Verbal** and **Performance tests**.

Some of the **Verbal** Subtests include:

Social Common Sense questions: Why do we put stamps on letters?

Information questions: Who discovered America?

Vocabulary definitions: What does "abbreviate" mean?

Arithmetic: On the WAIS this subtest does not allow the subject to read or write information. The subtest is a series of questions delivered by the evaluator.

Similarities: The measures the subjects ability to compare things. For example: How is a pencil and pen alike?

Some of the **Performance** Subtests include:

Picture Completion: In this subtest the student would be shown a picture where something is missing. For example: A student might be shown the picture of a cat with whiskers on only one side of his face.

Picture Arrangement: In this subtest the student would be shown a series of pictures and asked to put them in order.

Coding: Demands that the subject copy symbols to another area. This is a measure of speed.

2	4	6	7	8
#	x	*	^	+

4	6	2	8	7

Symbol Search: In this subtest the subject is asked to find if the symbols given in the first column are also in the second column.

*	@ \$ % ^ & * + : } x > < ` ~
^ >	@ # \$ & ^ (: " ? x % ! =]
" ?	& # \$ ^ x @ } [? b % - } ,
= "	\$ % ^ @ & * x ; " < > ? / ~
x +	_ & ^ % \$ # @ , . / \ + ! ~

Notice that for the most part aptitude tests do not rely on the subject's ability to use material which is "studied" but rather it relies on the subject to use material that is often apparent in everyday functioning.

D. Underachievement - not performing at the level expected given Ability...can be due to low motivation, poor study skills or a learning disability. Students are thought to be underachieving when their IQ is measurably higher than their achievement scores. Currently the difference must be 2 standard deviations or more. A learning problem (in psychological terms called a disorder) is not diagnosed if the student 1) has poor study skills, 2) has not been exposed to the information, 3) is not motivated to learn.

E. What is measured in Achievement Tests?

F. **Achievement** - what you can do. In learning, Achievement is measure by the subject's ability to perform tasks which are learned. For example, a final exam would be considered an achievement test.

Questions on an achievement test might include analogies:

Boy is to girl as man is to _____

Math questions such as: What is the area of a circle if the Diameter of the circle is 10 feet?

Questions in Geometry such as:

In a right triangle if one angel is 15 degrees, what is the measurement of the 3rd angle?

Achievement tests can measure various areas. They include: The ability to write, grammar, spelling, math, word problems, vocabulary, and history.

Often achievement tests are untimed. The subject is allowed as much time as needed to complete the section.

G. **Reading Comprehension** - understanding what is read. Measured by the ability to answer questions on previously read material.

H. **Math Calculation** - solving basic number problems. These problems typically do not include calculations which demand the student know or understand formulas, for example in finding the area of a circle.

I. **Math Reasoning** - solving story problems or real-life math situations. Often measured by the student's ability to solve word problems.

J. Written Expression - giving information in writing. This measures the or the student to express ideas coherently and in sequential order.

K. Oral Expression - giving information by talking. Skill in this area can be measured by the subject's ability to speak extemporaneously, to speak coherently, and to include enough information to formulate a comprehensive answer.

Students who have significantly higher scores on aptitude than on achievement tests are often called **underachievers**.

L. Memory

There are several types of memory that are measured:

Listening (Auditory) Memory - understanding what you hear. Measured by the ability to remember it immediately after it is given, and then ½ hour later.

Visual Memory – the ability to understand and remember what you see: Measured by the ability to recall it immediately after it is shown, and then ½ hour later.

Memory tests often divide these skills into specific areas. For example, the subject may be told a story, given sentences or letters to remember. Some individuals do better remembering sentences because stories have too much material to remember. In other cases, the subject remembers the context of the story, and therefore, is able to do better on story memory than on sentence or letter memory.

The subject's ability to remember is considered critical in the learning paradigm. Individuals who do not recognize or recall material often have a significantly more difficulty time in academia.

<http://www.neuroskills.com/> (More information can be found at this site.)

II. Why do learning problems occur?

Learning problems usually occur for one of three reasons:

1.) The most common reason is **genetics**. In fact, learning disabled individuals have families with a history of learning issues almost 70% of the time.

2.) The second most common reason is **cortical injuries**. Many of these injuries occur during the birth process. Other injuries occur because of head injuries. Some injuries are very mild, for example, there is considerable evidence that soccer players have a history of mild injury from using their head during the game. Head injuries also occur in car accidents. Even mild accidents can cause a whiplash which can result in difficulty with attention and concentration, sometimes for a limited amount of time. These types of injuries typically affect processing speed and attention. More information is given under "concussion" in this document.

3.) The third reason is "**unknown etiology**."

We often do not have knowledge of how or why a learning issue occurs.

A. When do learning issues occur?

Learning issues are **long standing**. That is, unless there is evidence of a cortical (brain) injury (and then the disability would occur later without developmental markers), learning disabilities and ADD/ADHD are **first evidenced in elementary school**. In order to meet the criteria in the DSM IV (which is the diagnostic manual that lists symptoms of ADHD and Learning Disorders) **the individual with Attention Deficit/Hyperactivity Disorder must show symptoms before age 7**.

There is no specific age of onset for learning disorders, however, they are still evidenced in elementary school. Since different areas of the brain perform different functions,

the age the difficulty presents often helps the practitioner to identify the area of injury.

B. What is ADD?

Technically, ADD does not exist. **ADD is the abbreviation for ADHD**, primarily inattentive type. According to the latest revision of the DSM, **Attention Deficit/Hyperactivity Disorder can be divided into three types.**

- 1.) primarily *inattentive* type;
- 2.) primarily *hyperactive-impulsive* type; and
- 3.) *combined* type.

Beyond that, symptoms can be classified as mild, moderate or severe. There are classifications for when some, but not all the symptoms are met (provisional, residual, not otherwise specified... etc.)

An attention deficit disorder is a medical condition which affects a person's ability to concentrate and maintain attention to tasks. Often the two terms are used interchangeably and the combination term "AD/HD" is frequently used.

C. Are there differences between girls and boys with an ADHD diagnosis?

There is evidence that girls and boys present differently. Whereas **boys tend to be hyperactive** from a young age, and then tend to present with symptoms that are primarily inattentive in nature by the time they reach high school, girls often never show symptoms of hyperactivity. **Girls typically present with symptoms of underachievement** even when they are very young, and never meet the criteria for ADHD combined type.

D. Did ADHD always exist?

ADHD has been recognized for a number of years. It was first referred to as Minimal Brain Disorder. Its organic nature has been recognized since 1930. The symptom complex the individual displays is continually refined with each revision of the Diagnostic Manual.

E. Are there differences in the brain of an ADHD individual? What differences are found in brain structure?

In studying the brains of boys diagnosed with ADHD, there were significant differences found. Three structures in the affected circuit on the right side of the brain -- prefrontal cortex, caudate nucleus and globus pallidus -- were smaller than normal in the boys with ADHD, when examined as a group. The prefrontal cortex, located in the frontal lobe just behind the forehead, is believed to serve as the brain's command center. The caudate nucleus and globus pallidus, located near the middle of the brain, translate the commands into action.

"If the prefrontal cortex is the steering wheel, the caudate and globus are the accelerator and brakes. And it's this braking or inhibitory function that is likely impaired in ADHD." (Castellanos) ADHD is thought to be rooted in an inability to inhibit thoughts. Finding smaller right hemisphere brain structures responsible for such "executive" functions strengthens support for this hypothesis.

F. How is AD/HD diagnosed?

AD/HD cannot be diagnosed by any type of neurological or laboratory test. The diagnosis is based upon a set of behavioral characteristics, and as such, can be a rather subjective process. Often a practitioner makes the diagnosis based upon observation of the child and interview of the parent about behavioral characteristics which are observed at home or at school. Frequently the school will be involved in the process through behavior ratings which are completed by teachers. There are various types of computerized performance "tests" which are designed to directly measure a student's ability to maintain attention to a computer task.

G. How common is AD/HD?

Depending on the source, it is estimated that somewhere between 10% and 18% of the population is experiencing some form of attentional deficit or learning disorder. But since the condition involves behavioral characteristics which can range from very mild to extremely severe, many undiagnosed students may exhibit behaviors very similar to those of students who are diagnosed with ADD or ADHD.

H. What about medication?

When a child is diagnosed with an attention disorder, one of the decisions is whether or not to treat the condition with medication. Typically, the medication prescribed is a cortical stimulant - most commonly Ritalin. Last January Strattera was introduced. This medication is not a stimulant but has been reported helpful for students.

There are many forms of cortical stimulants. Some are time release capsules.

Although stimulants are usually highly effective, there are potential side effects which can include loss of appetite, sleep disturbance, and less often "tics". There have been some cases where children developed "tics" after initiating medication and later were diagnosed with Tourette's Disorder. Many professionals believe these individuals had an underlying Tic disorder. It is possible that the behavioral characteristics first diagnosed as AD/HD were actually early symptoms of Tourette's, and the medication simply helped to progress the disorder to the next stage.

Stimulant medication, when introduced at an early age and combined with positive behavioral interventions, has proven to be highly effective for treating ADHD. When introduced at later ages, medication has been somewhat less effective primarily because negative behavioral patterns have often already been firmly established by this time. While the medication may help students make better behavioral choices, the choices are still subject to the will of the student.

I. What is a learning disability?

A learning disability is a legal term. Psychologists can diagnose Learning Disorders. There is no diagnosis for “disability” in the DSM. However, typically learning disorders are considered learning disabilities. The DSM lists many learning disorders.

J. What are Learning Disorders?

A learning Disorder is a psychological term. Learning Disorders are diagnosed when the individual’s achievement on individualized administered, standardized tests in reading, mathematics or written expression is 1.5 – 2.0 standard deviations below what would be expected given results from an aptitude (IQ) test. There are a number of areas addressed. They include **Reading Disorder, Mathematics Disorder, and Disorder of Written Language**. Another area includes **Communication Disorders**. This category includes **Expressive Language Disorder, Mixed Receptive-Expressive Language Disorder, Phonological Disorder** (formerly Developmental Articulation Disorder), **Stuttering Disorder**, and **Communication Disorder Not Otherwise Specified**.

K. What other disorders are listed in the DSM?

Rarely often seen in individuals who have normal or above intelligence are:

Pervasive Developmental Disorders: These disorders affect social and academic areas much more profoundly. In this category **Autistic Disorder**, **Rett's Disorder** (The essential feature is the development of multiple specific deficiencies following a period of "normal" development, usually for about five months.) **Childhood Disintegrative Disorder** (The essential feature is marked regression in multiple areas of functioning following a period of at least 2 years of "normal" development.), **Asperger's Disorder**, (The essential features include severe sustained impairment in social interaction and the development of restricted, repetitive patterns. Most are primarily NONVERBAL in nature as compared to Autistic Disorder, where verbal abilities are severely affected.) and **Pervasive Developmental Disorder Not Otherwise Specified**.

Also listed are **Rumination** and other **Eating Disorders**, **Mental Retardation**, and **Tic Disorders**.

L. What is "Not Otherwise Specified"?

In this case the presentation of symptoms conform to the general guidelines and cause impairment but the symptomatic picture does not meet the criteria OR there is uncertain etiology OR insufficient opportunity for complete data collection.

M. Can learning disabilities be healed?

Technically, Learning Disorders cannot be healed, however, **the individual CAN learn how work with the limitation**, much like we learn to work with any of our difficulties.

For example, if we can not move too quickly physically we learn that it takes us longer to get from one place to another. If we have difficulty with directions, we learn how to use a map, or to be sure to get verbal directions or we find whatever it is we need in order to get to where we need to go. Likewise, individuals with learning difficulties who find it takes longer to finish tasks need to learn to start assignments earlier. Individuals who have difficulty with organization can learn different organizational techniques, etc.

N. Can medication help Learning Disabilities as well as ADHD?

Sometimes. **The common use of medication is with ADHD** where a cortical stimulant is prescribed to help with attention and with processing speed. However, in a few cases a cortical stimulant can help with a learning disorder. Also, since these difficulties often create anxiety and depression, other psychotropic medications may be helpful.

O. Are medications prescribed too often?

This is a difficult question. Like any other answer in psychology the answer is: **It depends**. It depends on the practitioner, the method of diagnosis, and the individual. Often medication is prescribed from described symptoms. In those circumstances the exact etiology of the difficulty remains a mystery. There is some evidence that a cortical stimulant such as Ritalin will improve performance for almost all students. If adequate testing is required prior to

medication, the exact nature of the difficulty will be understood. Medication in and of itself is rarely adequate to resolve learning difficulties. Medication should be used as an adjunct. Remediation and structure remain the essential features of ameliorating symptoms.

Using a medication trial as a means of diagnosis was often used in the past. There are many reasons for this. For example, medical insurance companies often preferred to use a medication trial instead of testing because the cost differential was substantial. Testing takes more time and is inconvenient. However, a medication trial does not identify the cause or intensity of the learning problem.

P. How does a learning difficulty or attentional difficulty affect teaching?

Typically, **individuals learn through three modalities: Visual, Aural or Kinesthetic**. Teachers who use what is termed a multimodal presentation are usually more effective in helping students learn. Specifically, the student can be presented with:

1. Visual stimuli (the student can see what is presented)
2. Aural Stimuli (the student can hear the material)
3. Kinesthetic (the student gets an opportunity to use the material with hands-on tasks)

Q. What are the critical features in learning?

1. **Attention** (I pay attention to what is presented)
2. **Memory** (I remember what is presented)
3. **Association** (I can relate it to previously learned material)

R. Are there critical areas which psychologists have found to be definitive in learning?

Psychologists have identified two basic areas which can be correlated to academic success. They are:

1. **IQ**
2. **Vocabulary**

Interestingly, vocabulary does not relate to success in mathematics.

S. What is the relationship with mathematics and definitive learning areas?

Students who do well in math have the following basic criteria:

1. They know and understand basics such as multiplication and division.
2. They understand concepts that are related to solving problems (parenthesis first, etc.)
3. They understand concepts. They can relate what they are doing to actual life experiences. For example, they understand how to relate calculations to word problems. Students who have difficulty with word problems usually have one of two difficulties: a.) They cannot read and interpret the problem, or b.) They can read the problem but do not have the basic knowledge in math to solve it.

T. Additionally, students learn better when:

1. **They have read about the material BEFORE** coming to the lecture. (Compliance can be increased by using quizzes when the reading assignment is due.)
2. **Students are familiar with the material** from working with it in some manner. (Compliance can also be enhanced by using “fill in the blanks” study guides.)
3. **They have an outline** of the material presented so that they can follow the lecture as it progresses.
4. **They have a clear understanding of important points.**
5. **They review their notes** as soon as possible after the lecture.

U. Interesting points:

1. **Students remember what they get “wrong” better than what they get “right”.** Giving a pretest is often a better way of helping students remember material.
2. Presenting material using **a variety of methods** creates multiple cognitive maps. See Cognitive Maps in other handouts for more information.
3. **Teachers who note the important information** which will be on the test usually are more successful at helping students know what to study. This is often ineffective the first time it is used.
4. Students tend to attend better when **they know they will be asked about the information afterward.** Even continuing education requirements have benefited from this research. Almost all continuing education presentations have a post quiz. While these quizzes ensure that the student remains during the lecture, they have also been found to increase attention, and therefore, retention.
5. Students learn more from **practice tests** than they do from passive reading.

6. Generally speaking **proactive learning** techniques are more successful. Passive learning techniques do not promote attention and concentration. Therefore, passive techniques do not clue the student when attention wanders.
7. Students remember **“unfinished”** tasks better than “finished” tasks. Starting a task in class and interrupting it will enhance memory.
8. One of the best learning techniques includes **immediate feedback**.
9. **Computer based learning** programs are thought to be extremely effective. They allow the student to move at their own pace, increase repetition, demand the student be actively involved and give immediate feedback.
10. Of course **repetition** is helpful... especially when it involves the use of multimodal techniques and active participation.

V. Why do students do poorly on tests?

1. **They THINK they know** material, but they do not.
2. **They race through information** thinking “the next time I’ll get it right”, but the next time never comes. They continually “skip over” their mistakes rationalizing that they will get it right next time.
3. **They are anxious** and this interferes with memory and performance.
4. They have difficulty paying attention.
5. **They have not studied** OR they have not studied effectively.

W. What are the essential features of helping a student?

1. **Desire.** Most students DO want to learn. Sometimes a history of failure will cause students to give up on themselves. But very young students have a tremendous curiosity and desire to learn.
2. **Ability.** While motivation is more important than ability, ability is still critical.
3. **The teacher can analyze** and address the problem adequately. Sometimes the teacher simply repeats a process the student does not understand. Explaining to the student the problem they are experiencing and communicating how to solve the difficulty is a key feature in solving any problem.
4. **Continuous feedback** about performance. Much of the time the student will minimize, ignore or deny there is a difficulty; particularly students who have learning issues. Students with learning issues are often embarrassed by their difficulty and want to deny the existence of the problem or ignore the problems they have with the material.
5. **Various assessment tools.** Some students have better results on multiple choice tests. Other students do better with essays or verbal presentations (okay, not a lot of students like verbal presentations.) Using a variety of techniques helps both the teacher and student access the knowledge and ability of the student.

X. What has the “popularity” of learning issues created and how does it affect teaching?

For students who have learning issues, the **recognition that that many people with learning disabilities have been extremely successful** has given them a sense of hope. Many individuals equate success with learning. They do not understand the discrete nature of a disability and globalize the learning issue to encompass all aspects of functioning.

It has allowed students who have learning issues to recognize themselves and to have others recognize that **intellectual level is not related to performance**. Learning disabilities are diagnosed in individuals who have normal or above normal intelligence. This is also one of the reasons that it is not diagnosed adequately.

Many individuals recognize the innate intelligence of a child and believe that "bright" children cannot have learning issues. Another part of this issue relates to the ability of an individual who has an IQ above 120 to find their own methods to compensate for learning problems. In fact, many individuals who do have a high IQ are not diagnosed primarily because they learn techniques on the own and still function, although not at the level expected. These are the classic underachievers who are not diagnosed until they are older when the amount of information they are expected to process and the complexity of the material confounds their creative energies in finding self devised remediative techniques. Most often these individuals need extended time for processing in order to function adequately.

However, it should also be noted that:

Learning disorders and ADD have created a situation where **some students (and their parents) mistake a learning problem for poor study skills.** Students who have a learning difficulty learn differently. Their difficulty would not disappear if they spent longer periods of time studying in a “traditional manner”. The criteria for Learning Disorders and Attention Deficit Hyperactivity Disorder can be found in the Diagnostic and Statistical Manual of Mental Disorders, fourth Edition, Text Revision, (DSM-IV-TR tm).

Students who are given accommodations in public school have a *Diagnosed* disorder. For example, students who have a Reading Disorder because they have difficulty with sound/symbol relationships will spend an enormous amount of time reading and STILL not understand the material. Reading involves a number of complex processes. The student needs to decode the symbols, relate them to sound/symbol relationships already learned, translate the vocabulary, and break it in to smaller passages that make sense, hold the material mentally, relate it to previous material in the passage and sometimes relate it to other material previously learned. Any difficulty in this process will inhibit the student from comprehending the specific material. However, given **Books on Tape**, these students often have little or no difficulty understanding the material.

Y. If you don't out grow a learning problem, how come these individuals do not have difficulty in the “real world?”

Students with learning issues have the most difficulty in areas where they must meet demands that revolve around their specific area of difficulty. For example, a student with spatial difficulty has the most difficulty in geometry; however, the same student may be extremely competent in algebra. But in the real world, individuals can choose what they want to do. A student who has difficulty with sound relationships will probably not become a translator. When these students pick occupations they will typically choose areas where their difficulty is not the central core of their functioning. In school, students do not have this luxury.

Z. What is a "diagnosis?"

In order to meet the criteria for diagnosis of a learning disability or ADHD, the student must meet the criteria in the DSM. There are five AXISES that provide information. They are:

AXIS I: Learning Disorders, ADHD, and other Mental Disorders such as depression and anxiety are listed on this axis.

AXIS II: Personality Disorders and Mental Retardation are listed on this Axis. Research has found that these difficulties are resistant and resolution is not expected. *Previously LD, ADHD and Developmental Disorders were listed on this axis.*

AXIS III: General Medical Conditions that are potentially relevant to the understanding or management of the mental disorder listed in Axis I or II are listed on this Axis.

AXIS IV: Psychosocial and Environmental Problems are listed on this Axis. These include difficulty with family, school, or occupation, the legal system, finances or housing.

AXIS V: The Global Assessment of Functioning (GAF) Scale This scale is measured from 0 to 100. A score of 90 represents minimal symptoms (mild test anxiety), 80

represents transient symptoms and expectable reactions, 70 some difficulty in occupational or school functioning, 60 moderate symptoms, 50 serious symptoms which create serious impairment, etc. This scale allows the practitioner to compare the individual's current functioning with another criterion.

There are often two scores given on this AXIS. Most often, first relates to present functioning and the second to functioning in the past year. Sometimes there are two scores which represent admission and discharge from a hospital. Sometimes the scores relate to functioning before and after a specific trauma.

Previously this was the GAS (Global Assessment Scale) measured on a scale with a ceiling of 90.

A diagnosis might look like this:

Axis I: 296.23 Major Depressive Disorder, Recurrent, Mild
314.01 Attention Deficit Hyperactivity disorder,
Combined Type, moderate.

Axis II: No Diagnosis

Axis III: Chronic pain from Arthritis

Axis IV: Underemployment, financial difficulties

Axis V: GAF = 71 (current) 80 (past year)

While the above represents a complete diagnosis and is completed when one practitioner is giving information to another, often only Axis I is given to the insurance company to protect the confidentiality of the individual.

III. Head Injury

A. What are the symptoms of concussion?

People often ask about the symptoms of a concussion. This list is composed primarily from information acquired from the above listed site. The information has been clarified but the site is interactive and worth visiting if you are interested in learning about brain function.

It is important to recognize that a period of unconsciousness is not a criterion for concussion. However, unconsciousness can but will not definitively indicate a more serious problem. Sometimes even mild head injuries will create serious difficulties. Sometimes very serious head injuries result in far fewer difficulties than anticipated. The sequelae which results from an injury relates to a number of criteria. These include: age of injury, extent of injury, area of injury, and type of injury. Premorbid functioning (functioning before the incident) is highly correlated with postmorbid functioning.

B. Here are some of the symptoms of a concussion:

1. Low-grade headaches that won't go away
2. More trouble than usual:
 - a. Remembering things (especially with short term memory)

- b. Paying attention or concentrating (sustained attention)
 - c. Organizing daily tasks (starting and stopping tasks)
 - d. Making decisions and solving problems (more serious cases)
3. Slowness in thinking, acting, speaking, or reading (processing speed is affected)
 4. Getting lost or easily confused (spatial problems, estimating, etc.)
 5. Neck pain (suggests stretching of the neck and nerve endings were involved)
 6. Feeling tired all the time, lack of energy (often involved in healing)
 7. Change in sleeping pattern: (particularly middle of the night awakening)
 - a. Sleeping for much longer periods of time than before (see #6)
 - b. Trouble sleeping or insomnia (see #7)
 8. Loss of balance, feeling light-headed or dizzy (less common)
 9. Increased sensitivity to:
 - a. Sounds (particularly distraction)
 - b. Lights (especially florescent)
 - c. Distractions (creating starting and stopping a task)
 10. Blurred vision or eyes that tire easily
 11. Loss of sense of taste or smell (particularly with frontal or whiplash type injuries)
 12. Ringing in the ears (tinnitus)
 13. Change in sexual drive (usually decreased libido sometimes because of depression)
 14. Mood changes: (lability)
 - a. Feeling sad, anxious, or listless (irritable, particularly with depression related situations)
 - b. Becoming easily irritated or angry for little or no reason (low frustration tolerance)
 - c. Lack of motivation (sense of easy failure)

In traumatic brain injury the brain may be injured in a specific location or the injury may be diffused affecting many different parts of the brain. Injuries associated with a specific location are easier to remediate although when they involve areas where the information is transferred to other areas, the effect can be more complex to remediate. It is this indefinite nature of brain injury that makes treatment unique for each individual patient. This indefinite nature also complicates the treatment program and makes it harder to define, implement and understand. In the past twenty years, a great deal has been learned about brain function, and we learn more everyday. We can make guesses about the nature of the problems an individual may have from knowing the location of a lesion. Diagnostic procedures such as CT scans and MRI's can also provide information about a brain injury. However these instruments only scratch the surface of brain dysfunction diagnosis. Often they do not indicate there is a problem when the problem is not profound. Another instrument which is often used is called the PET scan. This instrument measures the amount of energy used by different parts of the brain and the scan can be performed when the patient is engaged in a specific activity thereby creating even more specific information on cerebral function.

Even with these types of diagnostic tools, the accuracy of diagnosing cerebral dysfunction remains evasive. This is because diagnosis must be done using noninvasive technology. Invasive diagnosis is prohibitive because it will add to the injury, but even in research it is rarely used.

However, much of the diagnostic information was collected by Alexander Luria who interviewed a

number of soldiers before they went to war. Those who were unlucky enough to be killed were returned to his laboratory where their brains were examined. Through these procedures Luria was able to correlate brain function with specific areas of the cerebral cortex. Much of what we know today is connected to his research.

By studying Luria's work, rehabilitation specialists learn about an injury by observing the day to day activities of the patient. All the activities we perform each day, whether physical or mental, are directed by different parts of our brains. It is important that to become familiar with brain function to better understand how therapies, created by rehabilitation professionals, help brain injured patients. In order for to better understand how the rehabilitation process works, it is important to understand how different parts of the brain relate to some of the functions and problems resulting from injury.

The brain has many parts. The main divisions include the cerebral cortex or upper brain, brain stem, primarily related to organic functions, and cerebellum, which relates primarily to body movement.

By listing some of the functions of each part of the brain, the reader can gain an overview of specific problems which often occur after there is an injury affecting these areas. It is important to remember that the brain functions as a whole not only by using these specific areas based on the function they provide, but also, by interrelating its component parts. While a specific injury may disrupt a particular activity, the interruption of that activity may interrupt other functions directly. It may also interrupt a sequence necessary to

complete specific tasks. Often identifying the tasks that are affected can reveal the site of the injury. Below is a list of functions and deficits or problems which commonly occur when a particular area is injured. The terms in parenthesis are the professional terms used to describe the deficit.

IV. Looking at the

CEREBRAL CORTEX

A. Frontal Lobe: Most anterior, right under the forehead.

Functions:

- How we know what we are doing within our environment (*Consciousness*).
- How we initiate activity in response to our environment. (implementation)
- Judgments we make about what occurs in our daily activities.
- Controls our emotional response. (creates liability if injured)
- Controls our expressive language. (impulsivity)
- Assigns meaning to the words we choose. (associated with judgment and with connections, i.e., sun and son or parables)
- Involves word associations. (see above)
- Memory for habits and motor activities. (some association with animal instinct)

Observed Problems:

- Loss of simple movement of various body parts (**Paralysis**).

- Inability to plan a sequence of complex movements needed to complete multi-stepped tasks, such as making coffee (**Sequencing**).
- Loss of spontaneity in interacting with others.
- Loss of flexibility in thinking. (usually because the individual cannot figure out alternative methods for success.)
- Persistence of a single thought (**Perseveration**).
- Inability to focus on task (**sustained attention**).
- Mood changes (**Emotionally Labile**).
- Changes in social behavior. (poor judgment, inability to read prosody)
- Changes in personality.
- Difficulty with problem solving.
- Inability to express language (**Broca's Aphasia**). Broca's areas is technically in the right temporal region, but this area is often affected with frontal lobe injuries.

B. Parietal Lobes: near the middle and top of the head.

Functions:

- Location for visual *attention*.
- Location for touch perception, more specifically the ability to understand kinesthetic input, for example the ability to identify a quarter while it is in your pocket.
- Goal directed voluntary movements.
- Manipulation of objects, the ability to put puzzles together
- Integration of different senses that allows for understanding a single concept. (sensory integration)

Observed Problems:

- Inability to attend to more than one object at a time, difficulty with working memory or simultaneous processing
- Inability to name an object (**Anomia**), commonly called word finding difficulty
- Inability to locate the words for writing (**Agraphia**), difficulty remembering how to spell a specific common word
- Problems with reading (**Alexia**), difficulty with the sound/symbol relationships of letter and sounds causing difficulty pronouncing new words.
- Difficulty with drawing objects, usually related to space relationships.
- Difficulty in distinguishing left from right, again difficulty with spatial relationships
- Difficulty with doing mathematics (**Dyscalculia**), often related to difficulty with estimating, also confused with frontal lobe difficulty
- Lack of awareness of certain body parts and/or surrounding space (Apraxia) that leads to difficulties in self-care. Also creates a sense of clumsiness.
- Inability to focus visual attention.
- Difficulties with eye and hand coordination. Often results in dropping objects, etc.

C. Occipital Lobe: Most posterior, at the back of the head.

Functions:

Vision

Observed Problems:

- Defects in vision (**Visual Field Cuts**), not seeing the entire visual field
- Difficulty with locating objects in environment, often related to the above
- Difficulty with identifying colors (**Color Agnosia**) sometimes creating color blindness.
- Production of hallucinations (seeing things that aren't there)
- Visual illusions - inaccurately seeing objects (misinterpreting what is seen)
- Word blindness - inability to recognize words.
- Difficulty in recognizing drawn objects different from spatial difficulty, this area usually relates to visual errors, not spatial judgment errors
- Inability to recognize the movement of an object (**Movement Agnosia**).
- Difficulties with reading and writing because of visual difficulty

D. Temporal Lobes: Side of head above ears.

Functions:

- Hearing ability
- Memory acquisition
- Some visual perceptions
- Categorization of objects.

Observed Problems:

- Difficulty in recognizing faces

- **(Prosopagnosia)**.
- Difficulty in understanding spoken words **(Wernicke's Aphasia)** this is also sometimes seen with frontal lobe injuries.
- Disturbance with selective attention to what we see and hear.
- Difficulty with identification of, and verbalization about objects.
- Short-term memory loss.
- Interference with long-term memory
- Increased or decreased interest in sexual behavior.
- Inability to categorize objects **(Categorization)**.
- Right lobe damage can cause persistent talking.
- Increased aggressive behavior also seen with (frontal lobe damage)

E. Brain Stem:

Deep in Brain, leads to spinal cord.

Functions:

- Breathing
- Heart Rate
- Swallowing
- Reflexes to seeing and hearing **(Startle Response)**.
- Controls sweating, blood pressure, digestion, temperature **(Autonomic Nervous System)**.
- Affects level of alertness.

- Ability to sleep.
- Sense of balance (**Vestibular Function**).

Observed Problems:

- Decreased vital capacity in breathing, important for speech.
- Swallowing food and water (**Dysphagia**).
- Difficulty with organization/perception of the environment.
- Problems with balance and movement.
- Dizziness and nausea (**Vertigo**).
- Sleeping difficulties (Insomnia, sleep apnea)

F. Cerebellum

Located at the base of the skull.

Functions:

- Coordination of voluntary movement
- Balance and equilibrium
- Some involvement with memory for reflex motor acts.

Observed Problems:

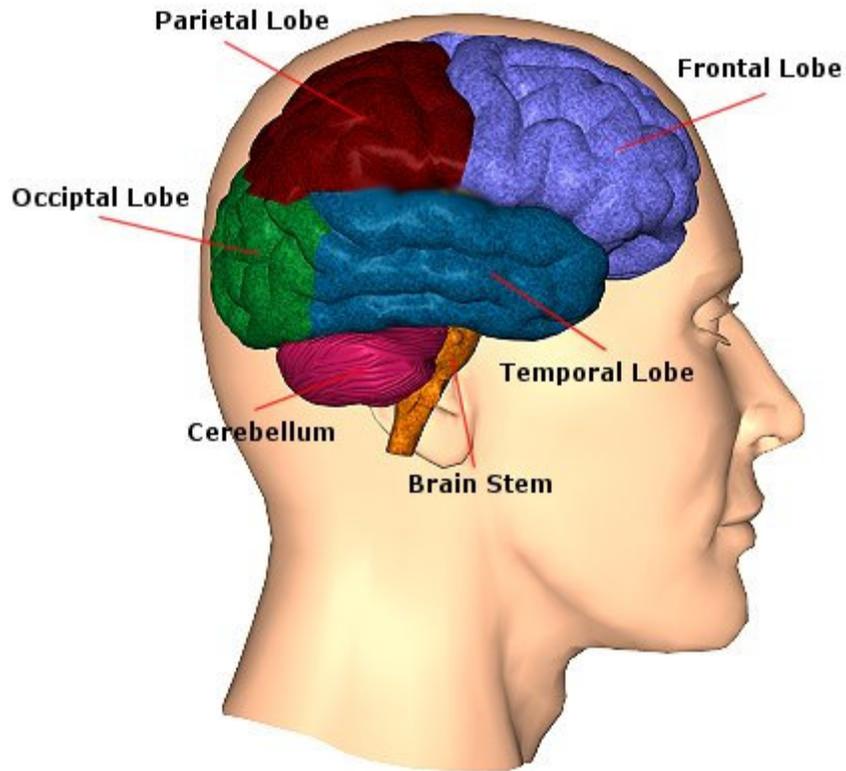
- Loss of ability to coordinate gross movements.
- Loss of ability to *coordinate* some fine motor activities
- Loss of ability to walk.
- Inability to reach out and grab objects.
- Tremors.
- Dizziness (**Vertigo**).
- Slurred Speech (**Scanning Speech**), not affecting articulation

- Inability to make rapid movements.

Obtaining a general understanding of the brain and its functions is important to understanding the remediation process. It is very important, however, to understand that the professional is concerned with the whole person. Often injuries result in the inability to perform certain functions. This results in the individual feeling less confident. For this reason, strategies are designed to work toward helping of the whole person.

Typically, cortical problems areas create pervasive functional difficulties. The antithesis of this problem is that resolving a difficulty affects other areas. Many times resolving one problem has a major impact on other problems. For example, (using a physical analogy) reestablishing postural balance and eliminating dizziness greatly enhances concentration and attention which allows for improved cognition and problem solving. This in turn creates more self esteem.

G. Brain Map



V. In order to get accommodations, the individual must show functional difficulties in a Major Life Activity

These are Major Life Activities as defined by our legal system

MAJOR LIFE ACTIVITIES include the following:

<ul style="list-style-type: none">• Hearing	<ul style="list-style-type: none">• Performing manual tasks
<ul style="list-style-type: none">• Breathing	<ul style="list-style-type: none">• Sleeping
<ul style="list-style-type: none">• Talking	<ul style="list-style-type: none">• Learning
<ul style="list-style-type: none">• Standing	<ul style="list-style-type: none">• Reaching
<ul style="list-style-type: none">• Walking	<ul style="list-style-type: none">• Thinking
<ul style="list-style-type: none">• Sitting	<ul style="list-style-type: none">• Concentrating
<ul style="list-style-type: none">• Seeing	<ul style="list-style-type: none">• Memorizing
<ul style="list-style-type: none">• Caring for oneself	<ul style="list-style-type: none">• Taking exams
<ul style="list-style-type: none">• Working	<ul style="list-style-type: none">• Interacting with others
<ul style="list-style-type: none">• Reading	<ul style="list-style-type: none">• Writing

VI. Processing: The Key to the Mystery

A. Process – a complex operation describing how the brain or cerebral cortex accepts and uses information. It is most easily understood by analyzing how an individual takes in and puts out information. Other important areas include how fast the information takes to become understandable when it is presented in different modalities, the length of time it takes to store or remember information, and the length of time it takes to recall information once it is needed.

B. Compensate - using a strength to make up for a weakness. In psychology it is the use of an area of strength to make up for an area of weakness and is considered one of Freud's defense mechanisms. In neuropsychology it is defined as the ability to use a processing avenue which is a relative strength to counterbalance for a relative weakness.

A. **Storage** - In learning this typically refers to memory. Memory is the ability to recall information for different lengths of time. There is immediate, short term and long term memory. (The definition of each of these differs depending on the text book you are using. In testing, Immediate Memory is just that, memory right after the information is given, and Short Term Memory is ½ hour later.)

D. Retrieval - getting something out of storage. In memory this usually refers to the ability to recall or recognize the information on demand. This may differ according to the modality, type of retrieval demanded and time restraints given.

For example, can you remember what color your colleague was wearing (visual memory)?

or

if I gave you a list of colors, could you choose the right color (visual recognition)?

Could you remember what we discussed a few minutes ago (Immediate Aural Memory)?

or

if I gave you a choice, could you remember what it was (Immediate Aural Recognition)?

If I asked you ½ hour from now it would be called Short Term Aural Memory Retrieval.

E. Sensory - using your senses (sight, hearing, touch, smell, taste); Neurophysiologists recognize 3 avenues of sensory input: Aural, Visual and Kinesthetic. The Kinesthetic avenue incorporates physical touch and emotional feelings. (Smell is considered a physical quality.) Punishment which creates sadness is supposed to create learning because of the emotional reaction that results from deprivation.

But that's another story....

F. Cognitive - using your brain, also referred to as organic. ADHD (Attention Deficit Hyperactivity Disorder) is considered an organic disability, that is, it is due to how the organism functions.

G. Sequencing - putting items in order. This is contrasted by simultaneous processing. In sequential tasks, the subject needs to use a certain order in order to solve a problem. Math problems often need to be completed sequentially. (You know, first get rid of the parenthesis, then multiply...)

H. Simultaneous tasks need to be solved at the same time, for example when you are trying to make dinner and all the dishes need to be done by 6pm.

Few tasks are purely sequential or purely simultaneous, but most have an emphasis on one of these processing modalities.

I. Conceptual - understanding concepts and deep meaning most of which cannot be concretized. For example, foreshadowing, or metaphors....

J. Holistic - looking at the "whole thing" instead of the parts. Recognizing that there are many aspects to the human subject.

K. Inferential - using your mind to "fill in" missing information. Information the subject incorporates into the problem without being told it directly.

L. Channel - a path used for information to travel. Also referred to as a modality.

M. Modality - a method used for processing information.

VII. What is "Processing"?

There are many, ...maybe even hundreds of ways in which the brain processes different kinds of information. But we will focus on types of processing most responsible for learning:

- **Sensory processing** - how your brain uses information from your senses (vision, hearing, touch, smell, taste)

and

- **Cognitive processing** - what your brain does after the information comes in through the senses

A. The Sensory Channels

Information is provided in many different ways but first enters the brain through 3 sensory processing channels or "modalities" which include:

Vision

Hearing

Kinesthetic

These channels are the first areas where information processing difficulties can be identified.

Kinesthetic:

Touch

Taste

Smell

Emotion

This modality is the best for very young children who have less proficiency in reading and writing. However, many adults find this is a much more comfortable way to learn.

Often this avenue is not used in the classroom in high school. The main sensory processing areas that cause learning difficulties at higher levels such as high school are:

- visual**: does your brain understand and remember what you see?

- auditory**: does your brain understand and remember what you hear.

Important notes:

Sensory processing is different from vision or hearing ability. In order for an individual to be diagnosed with a visual or auditory processing problem, the individual first has to establish that the physical ability to see and hear is not the cause of the problem.

A person with a visual processing disability is actually able to see as well as anyone else, but his or her brain has difficulty making sense of visual information or remembering it.

For such a student, auditory information is usually processed much faster and understood and remembered better.

Other sensory processing channels including smell, taste, and touch can be important but are seldom, if ever found to be primary areas of an information processing disability. There are various reasons for this. However, most individuals with a history of cortical injury to the frontal lobes have difficulty in this area. The sense of touch can be especially important and will be discussed further when we investigate "Haptic" processing.

Let's look closely at **visual** and **auditory** processing.

Visual Processing involves how well an individual processes visual information. When you see something, especially something complex, do you understand it quickly and easily? Can you "visualize" things (like pictures, shapes, words, etc.) in your head?

Young children have stronger visual processing abilities (on the whole) than older individuals. This may be related to the need for young children to use visual processing as that is their primary modality for input and remembering.

B. Visual Processing includes:

- seeing differences between Stimuli
- remembering visual details
- filling in missing parts in pictures or words
- remembering general characteristics
- visual-motor coordination (eye movement)
- visualization and imagination
- organization of your room, desk, etc. but not in terms of papers, in terms of objects, colors, etc.
- art

People with a general visual processing disability often experience most learning difficulty in the areas of **math** and **spelling** because they have trouble "visualizing" words, letters, symbols, etc. However, sound/symbol connections (the relationship between seeing the letter B and how it sounds) also plays an important role in spelling, so visual processing ability is said to influence this area. Likewise, in math, the individual's ability to sequence or in geometry to simultaneously process is also key.

Often learning difficulties encompass a conglomerate of skills. The number of difficulties, intelligence and the ability to compensate are usually more important than the seriousness of one learning issue. For example: An individual who is not able to process visually presented information but who is very intelligent, able to focus, and motivated will find ways to compensate for the inability to interpret visually presented stimuli. To compensate for this difficulty, the individual can be taught to verbalize the material. This translates the material into a different modality and ameliorates the effect of the visual processing difficulty.

C. Specific difficulties may include:

-writing

poor handwriting

poor spelling (cannot visualize the words)

missed punctuation

- math

difficulty visualizing problems

difficulty with cluttered worksheets

difficulty with problems that have extraneous information

- reading

slow speed

poor comprehension

-general

poor organization/planning/neatness

difficulty rechecking work for accuracy

difficulty learning by demonstration

difficulty learning by video

difficulty reading nonverbal cues

not learning from reading

Auditory processing involves how well you can understand auditory information. Can you "keep up" when people talk very fast? Can you tell voices apart easily (even on the phone)? Can you imagine the voices of familiar people in your head? Can you remember information that you hear?

C. Auditory Processing includes:

- hearing differences between sounds/voices
- remembering specific words or numbers (these two skills involved different parts of the brain)
- remembering general sound patterns
- Understanding even when you miss some sounds
- music

Specific difficulties may include:

- reading (especially in pronouncing sounds or words)

poor decoding of new words

mixing words up

- writing

poor spelling/mechanics

- communication

difficulty with expression

poor receptive language

difficulty with prosody

- general

difficulty following oral directions

difficulty learning in lectures

difficulty paying attention during lectures

difficulty following lecturer

D. The two main cognitive processing channels:

Once information is received through the sensory channels, it enters cognitive processing areas for deeper understanding, storage (memory), and later retrieval. Although there are different types of cognitive processing, research about the brain suggests that two of the most important processing areas are found in the two sides or "hemispheres" of the brain. Let's look closely at these processing areas:

Left and Right Brain

LEFT

RIGHT

Left-brain:

In most individuals, the left side of the brain is responsible for verbal tasks.

Sequential/organizational processing is the main filing system in your brain and is done in the left hemisphere.

It involves organizing and memorizing specific bits of information including facts, figures and formulas.

Right-brain:

The Right hemisphere is primarily responsible for nonverbal tasks, prosody and simultaneous processing.

Conceptual/holistic processing involves looking for "the big picture", overall patterns and underlying concepts for use in higher-order thinking, creating, and reasoning. However in order to process abstractly, the individual has to be able to process the information when presented at a concrete level. Otherwise the individual can misunderstand or come to the wrong conclusion.

This hemisphere allows the individual to organize the material and make sense of what is given. An individual can understand not only the fact, but also, how that fact influences the "big picture."

In general, the right side of the brain is responsible for reasoning, and creating. The left side organizes thoughts and ideas for efficient storage and expression.

In complex tasks both sides of the brain work together to solve a problem. For many LD students, certain avenues of processing are compromised. This makes it difficult to understand, remember or recall information given in certain modalities. For most students in high school and above, aural processing is more critical. For younger children visual processing is more important because that is how instructors usually present material.

Now let's see how these two processing areas affect learning.

Sequential/Organizational (left-brain) processing includes:

- Short-term memory for details
- organization of thoughts and materials
- attention to details
- putting words and thoughts in order

People experiencing a general Sequential/Organizational difficulty often have most learning difficulties in the areas of **basic reading, math computation, expressive language, and writing mechanics**. Specific difficulties may include:

handwriting
speed/clarity
letter reversals
spelling/mechanics
letters in wrong sequence (order)

- reading
decoding (sounding out words)
speed/fluency
remembering details
attention/concentration

- math
remembering formulas/steps

- communication
finding words for verbal or written expression

- general
planning lengthy assignments
remembering details
paying attention - easily distracted by surroundings
remembering names of people or objects
following specific directions

Conceptual/Holistic (right-brain) processing includes:

- memory for general themes or ideas
- reasoning
- spatial awareness
- general knowledge
- inferential thinking
- estimation/approximation
- conceptual understanding
- creativity/inventiveness
- reading comprehension
- use of context
- rhythm
- music
- art

People experiencing a general conceptual/holistic processing disability often perform quite well during early school years but later experience much difficulty with **reading comprehension, math reasoning, and creative writing.**

Specific difficulties may include:

- reading
Understanding (comprehension) irony, inferences, sarcasm
(This involves prosody and inferential prosody at that)
General comprehension

- Math (estimating)
Generalizing to new situations
Story problems

- written language
Creative writing

- Communication
General language comprehension
Understanding humor

- General
Global/general awareness
Attention - may focus too much on a specific area or may not be able to create sustained attention.

The final processing area explored in this document is **Processing Speed**. Processing Speed refers to how fast information travels through or is understood by your brain.

Students experience processing speed difficulty when required to process information through their weakest "channel" or "modality". For Learning Disabled students, especially at the high school level, a general weakness in processing speed causes difficulty in all modalities.

Difficulty with Attention and Concentration creates a processing speed difficulty in that the individual cannot focus on the problem at hand. Their wandering attention makes it difficult to finish time constrained tasks.

Attentional difficulties are often difficult for "normal" people to understand because when the individual is interested in the area, attentional difficulties disappear.

This is because the motivational component incorporated in a desired task is considerably stronger and helps the individual override the organic difficulty. Symptoms may also disappear if the ADHD individual works one on one. In this case, the individual is called back to the task by the teacher (or whoever) on a regular basis. This occurs with computer programs where there is immediate feedback.

Processing difficulties have a major effect on an individual. They have been described in various ways: having your brain work at 40 miles per hour when the rest of the world (and all the information around you) is going 55 miles per hour. You just can't keep up.... Watching TV and having a person change channels on you every 30 seconds...

E. Processing Speed affects:

- short-term memory (with time constraints)
- long-term retrieval (with time constraints)
- talking speed, word-finding, especially in front of an audience
- writing speed
- reading speed especially when reading in public
- reasoning (with time constraints)
- general response speed

People experiencing a general Processing Speed difficulty often have learning difficulties in all academic areas due to their inability to process information quickly. Specific difficulties may include:

- reading comprehension (the person forgets the material as they read)

Reading speed

- Math

Completing a series of problems especially if they are related

- written language

Writing speed

Clarity (with time pressure)

Sequencing (the individual loses focus because of slow cognitive speed)

- Communication

Delays in responding

Slow, deliberate speech

Word-finding difficulties

- General

Coping with implied or expressed time pressures

Always "a step behind"

Difficulty maintaining attention to tasks, they simply take too long

Exceeding time limits during tests

Trouble with social pressures to perform "faster"

Sensory + Cognitive = Perfect Partnership

Tasks require a combination of sensory and cognitive processing. Information first enters the brain through your senses, then goes on to the cognitive processing areas for understanding and finally enters another area for storage.

For example, if you look up a phone number or get it from someone you first use visual or auditory processing to get the information into your brain, then short term memory, recall and motor processing to dial. There are actually a few other factors in what may initially appear a very simple task, but difficulty in any of these areas can be problematic.

Let's take dialing a cell phone when you are driving: Looking up a phone number on your cell can be problematic. How about if you call someone for the number? Now we are testing your short term memory with distraction. Not only do you have the traffic, you also have to say good bye to whomever was kind enough to give you the number you are looking for. And then you have to dial. Can you do that without looking? Can you remember the number as you drive and wait for an available time to dial? Will the distractions caused by traffic and time create another difficulty?

Is it any wonder that information dials the number for you at no charge? If nothing else, the insurance companies should fund this service!

Here's another example. Pretend you have just witnessed a bank robbery.

You actually use several different processing areas for most tasks.

The overlap between processing areas may make it seem that you experience difficulty in several areas. What we are trying to remedy is the one area that causes the most difficulty most of the time.

The overlapping relationship between the sensory and cognitive processing modalities is important to recognize.

So, we have discovered that the main areas of information processing disability include":

Visual

Auditory

F. Haptic processing

Many psychologists believe haptic processing is very important. Many students learn through the "haptic" modality.

Haptic processing involves a combination of the sense of touch and the conceptual/holistic processing modality. Since very little "haptic" information is used in high school level instruction except in the arts, haptic processing is not often addressed.

Kinesthetic processing incorporates haptic processing but kinesthetic processing has the added component of emotion.

VIII. What is learning?

The acquisition of knowledge or skill
(Dictionary)

The process by which relatively permanent change occurs in behavioral potential as a result of experience. (Anderson)
citl.tamu.edu/citl-glossary-main.htm

Changes in an individual's behavior arising from experience.
www.prenhall.com/divisions/bp/app/armstrong/cw/glossary.html

a process based on experience that results in a relatively durable change in behavior or knowledge logical consequences events that follow behavior within a normal social environment long-term memory the final phase of memory in which information storage may last from hours to a lifetime
speialed.peoriaud.k12.az.us/psyggloss.htm

A process that "builds on or modifies understanding, capacities, abilities, attitudes and propensities in the individual." (See Inglis, Ling, & Joosten (1999) pp. 104-105)
There are different theories about learning, the most important being Humanistic, Behavioristic, Cognitive and Social Learning theory and each supports a different approach to teaching and therefore to distance education.
<https://courses.worldcampus.psu.edu/public/faculty/DEGlossary.shtml>

(1) the process of acquiring knowledge, attitudes, or skills from study, instruction, or experience. Source: Miller & Findlay 1996, p.167

(2) the knowledge, attitudes, or skills acquired.
www.anta.gov.au/textOnly.asp

Process by which experience or practice results in a relatively permanent change in behavior or potential behavior

webhome.idirect.com/~kehamilt/psydef5.html

IX. Methods of Learning

Play

Movement

Sound

Socializing

Exposure

A. Methods of getting information

Hearing

Seeing

Doing

If we know that we can acquire information and learn by using various modalities,

B. What is needed for learning to occur?

There are two critical factors that must be present for learning to occur.

1. Attention

Paying attention takes energy

Thinking the information is necessary makes it easier to pay attention

(if it's fun it's easier)

The physical condition....

Lighting

Physical comfort (warmth)

Limited Distractions

2. Memory: If you don't remember the material, you don't learn...

Memory is:

Enhanced by repeated exposures

Different modalities involve different areas of the cerebral cortex (brain).

Each modality creates what psychologists call a **cognitive map**.

The more modalities,

the more cognitive maps,

the more enhanced the learning,

the less probable

material will be
extinguished.

C. How do we measure the capacity of an individual to learn?

Aptitude:

Capacity to learn

Normal IQ being 100, we believe that most people with an IQ of 70 or higher are capable of functioning without support.

Intelligence has less to do with skill acquisition when there is a learning disability or attentional issue.

X. What is a learning Disability?

Disability/Ability/no learning

LD is a disorder that affects people's ability to either interpret what they see and hear, or to transmit information from one part of the brain to the other or to transmit information to the outside world.....

The acquisition and transmission of knowledge is a critical factor in functioning.

For example, an individual may take in visual information (occipital lobe) but in order to talk about what they see, the material must go through a series of processes. These processes involve a number of areas of the brain. Eventually, the individual must be able to remember what the object is they want to talk about and then say the name of the object (temporal lobe).

A. Individuals who have difficulty with even one of these processes can have significant difficulty functioning.

Limitations can show up in many ways--as specific difficulties with spoken and written language, coordination, self-control, or attention. Such difficulties extend to schoolwork and can impede learning to read, or to write, or to do math.

Learning disabilities are lifelong conditions that affect many parts of a person's life:

School or work,
Daily routines,
Family life, and
Sometimes friendships and play

Some individuals may learn to ameliorate the effect of these limitations.

However, in some individuals, overlapping learning disabilities are present. For these individuals ameliorating difficulties may be difficult and sometimes impossible.

The same situation may occur if the Learning disability is severe.

In these cases, accommodations are the only means the individual has of functioning adequately.

Other people may have a single, isolated learning problem that has little impact on other areas of their lives.

Or the individual's intelligence may be high enough to compensate for the problem....

Einstein, for example...

Or Edison...

Students who have an IQ above 120 (Superior Range) often remain undiagnosed because they learn to compensate for their difficulties. Only when they have to work with voluminous complex material does the difficulty become apparent.

In some cases the student can do the work, but the amount of information the student has to process becomes prohibitive (information overload). This problem is most apparent in professional schools where the curriculum cannot be manipulated, for example, in medical or dental school.

B. How does a learning disorder differ from a learning disability?

Learning Disability is a legal term. Medical professionals cannot diagnose a learning disability, per se. However, medical professionals can diagnose a learning disorder. Individuals with learning disorders are usually considered to have a learning disability.

C. Are students with Learning Disabilities supported academically?

In public schools, students who are labeled with a learning disability are given an Individualized Educational Program (IEP). In this program, students who have a documented disability receive special accommodations to help them succeed. These accommodations differ according to the type and intensity of difficulty.

In severe cases the curriculum is adjusted to help the individual compensate.

By in large, the most common accommodation is extended time. By definition extended time is either time and a half or double time. Often the student is tested in an environment with limited distractions.

D. Do all students who have a Learning Disability get accommodations?

Legally, in order to receive accommodations the student must have a *functional* limitation. That is, the disability must prevent them from participating in a major life function. Major life functions are listed on page____.

E. Is ADHD a learning disorder or a learning disability?

Oh, you wish it were so easy! The answer is... neither. Attentional difficulties required special legislation. Students who have attentional issues are covered under Chapter 504. Attentional difficulties are covered by special legislation.

There are a number of reasons for this. The primary reason is that individuals with ADHD can ameliorate and sometimes even eliminate the attentional difficulty with medication. There is no medication that can be used to ameliorate a learning disability.

F. What is the difference between an accommodation and remediation?

Students who learn to cope with their learning difficulties learn remediation techniques. These techniques do not require any specific changes on the part of the teacher.

Sometimes students cannot learn any specific technique that will allow them to compensate for their difficulty. In this case the student is afforded an accommodation. Extended time is an accommodation.

G. Why is extended time necessary?

Often the primary difficulty in the learning is related to the time the individual needs to process information. Psychologists call this *processing speed*. It is very difficult, if not impossible, to learn remediation techniques for this difficulty. Medication is of limited usefulness. Consequently, the accommodation of extended time is afforded to students who have this difficulty.

H. How is processing speed measured?

Processing speed is divided into several areas. It may change depending on what part of the cerebral cortex is involved in working with the material. It is affected by other learning disabilities and by the individual's intellectual level. Therefore, processing speed may change for a specific individual depending on the subject and material. For example, an individual may have difficulty with reading but not with math.

Sometimes verbal processing speed is hampered not by the ability of the cerebral cortex to work quickly, but because of other issues such as difficulty with sound/symbol relationships (sounding out words) present a difficulty. In order for an individual to be given accommodations on standardized tests such as the SATs, testing must identify the exact nature of the difficulty.

Other reasons for the difficulty must be ruled-out. These rule-outs include: poor study skills, English as a second language, and physical problems.

Individuals with attentional issues often have difficulty with processing speed because they are distracted, and therefore, they must continually call their attention back to the material in order to conceptualize and understand what is presented.

Processing speed may be affected by medication, fatigue, and mental illness such as anxiety or depression. Organic processes such as kidney function, diabetes and blood pressure affect this function.

I. What is working memory?

Working memory involves the individual's ability to hold and manipulate data mentally, that is, without writing it down or seeing it. In a busy office a secretary's ability to hold information is vital. The secretary must be able to answer the phone, answer a question from the administrator as they wiz by and sign a postal form as the postman walks in without forgetting she STILL has a person on hold. Secretaries who are not good with working memory often leave an individual on hold for long periods of time.....

Psychologists also call this process simultaneous processing, although sometimes the definitions of these functions have more discrete definitions.

Simultaneous processing technically involves working with two processes at once, taking notes, for example.

J. Are attentional difficulties related to working memory?

Often individuals who have difficulty paying attention for any length of time (sustained attention) have difficulty with working memory.

K. How do learning disorders affect learning?

Students with academic skills disorders are often years behind their classmates in developing reading, writing, or arithmetic skills. While there are many diagnoses in this category, the most common include:

- Developmental reading disorder
- Developmental writing disorder
- Developmental arithmetic disorder

Developmental Reading Disorder -- This type of disorder, also sometimes known as dyslexia, is quite widespread. Dyslexia is technically the inability to hold letters stable. For some individuals this is very challenging. They confuse was with saw, or through with though. As the individual becomes more competent as a reader, this problem becomes less of an issue. This is because the individual can decipher the word by the context of the passage or sentence and instable letters tend to affect the reading process less

severely. However, the public understanding of dyslexia incorporates a number of issues relating to reading.

A person can have problems in any of the tasks involved in reading. However, scientists found that a significant number of people with reading difficulty share an inability to relate sounds in spoken words with the symbols that represent them (sound symbol relationships). They have difficulty with fone vs. phone.

Other symptoms of this difficulty include trouble with rhyming games, such as rhyming. Scientists consider these skills fundamental for verbal learning. Remedial techniques can help many children with dyslexia acquire these skills.

There are many skills that contribute to reading comprehension. In order to read effectively the individual must have a basic knowledge of vocabulary. Vocabulary is a critical skill and is rarely related to a learning disability.

The individual also needs to be able to group words together in order to create meaningful relationships.

Then the individual needs to hold and relate the phrases to create meaningful ideas.

Finally, the individual must be able relate new ideas to already learned and stored material in order to understand or remember the new concepts. Association is a critical factor in learning.

The nature of reading disabilities presents differently as a student progresses in school. The focus of reading shifts from word identification to comprehension.

The reading process identified here is simplistic. Reading is a very complicated skill. The number of steps involved in the reading process creates a challenging problem when a student is having difficulty. Without identifying the specific nature of the problem, overcoming the reading problem can be very frustrating.

The complexity of this process explains why asking a student to persist by reading more only creates more frustration on the part of both the student and the teacher. Without identifying and addressing the specific nature of the difficulty the student is unlikely to progress very quickly.

Developmental Writing Disorder -- Writing, too, involves several brain areas and functions. The brain networks for vocabulary, grammar, fine motor coordination, and memory, and working memory are important components of functioning in this arena. Developmental writing disorder may result from problems in any of these areas.

Students who have difficulty in this area often request a note taker. This may simply be related to the student's inability to write quickly (a physical limitation). In cases where this is the problem, a computer may be used to overcome the difficulty.

In other cases the individual has difficulty holding the material and then transferring it to paper. In these cases the student may benefit from dictating material and then typing it.

Like a reading disorder, individuals with a Writing Disorder need to understand the exact nature of the difficulty in order to understand how to ameliorate the problem.

Developmental Arithmetic Disorder – Like other areas, arithmetic is a complex process. Even simple problems involve a series of steps. In order solve: 25 divided by 3 equals _____?

The student must first recognizing numbers and symbols. Next memorized facts such as the multiplication table, aligning numbers, and understanding abstract concepts like place value and fractions must be utilized. Problems with numbers or basic concepts are likely to show up early. Disabilities that appear in the later grades are more often tied to problems in reasoning, abstraction and spatial reasoning.

L. Complex learning problems....

Many aspects of speaking, listening, reading, writing, and arithmetic overlap and build on the same brain capabilities. So it's not surprising that people can be diagnosed as having more than one area of learning disability. This is particularly true of individuals with Reading Disorders.

Verbal skill areas are complex. The ability to understand language is basic to learning speech. Therefore, any disorder that hinders the ability to understand language also interferes with speech development. Speech difficulties hinder learning to read and write. A single gap in the brain's operation can disrupt many types of activity.

XI. What information is necessary to in order to ascertain if there is a learning problem?

Students who are being evaluated for a learning problem are often asked to fill out a history form. This is a short and incomplete list of areas that need to be examined.

A. Meds: the use of medication especially for students who are diagnosed as ADHD is considered necessary because accommodations are *not* given if medication could ameliorate or eliminate the problem.

On the other hand, a student may be taking medication which interferes with cortical processing. In this case the diagnosis of a learning problem is not made.

B. History of difficulty and accommodations: Since learning problems and ADHD are considered to be organic, students with these problems should have a history of difficulty (whether diagnosed or just documented). This often presents a problem with students who have a high IQ. These students are usually able to compensate for a learning difficulty until the material becomes too voluminous or too complex. Often these individuals are diagnosed later than expected. Other students who have difficulty in this area include those who have no diagnosis because the teacher or school allowed the student to take extended time to complete tests even though the documentation was not acquired.

C. Other family members who have documented difficulty: Since learning difficulties and ADHD are organic, it is commonly found in the family history of individuals who have a diagnosis of learning disorder or ADHD.

D. Birth complications: Many individuals who suffer hypoxia or other cortical injuries have resultant learning issues, particularly ADHD.

E. Head injury: Like birth complications, head injuries can result in permanent cortical dysfunction. However, students with head injuries may be covered by ADA but not IDEA. These individuals often have to go through a different process to receive accommodations.

F. Allergies: Many learning disabled students also suffer from allergies, particularly congenital allergies. Acquired allergies do not correlate with learning disabilities with the same statistical frequency as do congenital allergies but their presence is still noteworthy.

G. Ear infections: often tend to result in auditory processing difficulties although they do not cause hearing loss. This difficulty is difficult to explain, but documented.

Infection which affected the brain: Cortical infection is a leading cause of cortical dysfunction.

H. Previous diagnosis of behavior problems: Many individuals with learning issues are very frustrated with their inability to perform at the level they would like. When they are challenged by adults who do not understand their difficulty they often respond by oppositional behaviors. It is common that individuals with learning disabilities have a history of behavioral issues.

I. Uncorrected visual or hearing problems: In order for a learning disability to be diagnosed, the individual must have been evaluated for hearing and visual problems. These problems are considered correctable.

J. Time studying: Students who do not study enough, who do not know how to study or how are not motivated are not diagnosed as learning disability. Learning disabled students have organic problems. Insufficient time studying, poor study skills and low motivation have to be ruled out before a student can be considered learning disabled.

XII. Evaluation Questions specific to Attention and Concentration

A. Attention Deficit Hyperactivity Disorder (ADHD) can be divided into several types. For example, some individuals are just inattentive. The formal diagnosis is: Attention Deficit Hyperactivity Disorder, primarily inattentive type. (Please note that ADD does not exist as a formal diagnosis. The formal term for attention deficit is ALWAYS ADHD.) Some individuals have a combination of symptoms which include hyperactivity and attentional difficulties. The formal diagnosis for these individuals is: Attention Deficit Hyperactivity Disorder, combined type. There is also: Attention Deficit Hyperactivity Disorder primarily hyperactive type.

B. Are there differences between boys and girls that are relevant to the evaluation process?

Gender differences suggest that more boys than girls are hyperactive. Girls tend to withdraw and lose attention. Many present as underachievers. Boys are more likely to present as behavioral problems.

As children grow, this pattern changes and adolescents of both sexes tend to have a diagnosis of ADHD primarily inattentive type.

Almost all adults have managed to repress their hyperactivity to a point where their diagnosis is ADHD primarily inattentive type.

Researchers believe that this pattern explains why more boys than girls are diagnosed with ADHD when they are younger, yet the number of adolescents diagnosed show a more even pattern in gender distribution.

C. What areas are examined in suspected ADHD individuals?

Memory of **aurally** given material such as directions, ability to remember names of new people, ability to remember new phone numbers, ability to remember specific characters in a movie, ability to remember details of a story, ability to answer a question quickly... AD/HD individuals simply do not pay attention while someone else is speaking.

Organization, ability to break down a problem into smaller segments, ability to pay attention, ability to **follow directions** with 3 or more parts, ability to **read quickly**, handwriting neatness, punctuation, ability to express ideas when punctuation doesn't matter, letter/word orientation.

Ability to speak quickly and clearly, ability to **remember specific words**, ability to **solve mechanical or visual puzzles**, ability to **recognize voices**, ability to **stay focused**, creativity, sense of humor, rhythm, artistic skill, ability to work toward goal, directional ability, jigsaw puzzles, words of popular songs, tunes, go someplace new, coordination, rules to a game, ability to **finish a task** (quickly), ability to **sit still** for periods of time.

Other areas necessary to examine:

Family dynamics: A history of family dysfunction including frequent moves, lower social economic status, English not spoken at home and lack of parenting may explain learning difficulties. Families where a member is suffering from a physical or mental illness may create learning issues for the child.

History of mood disorder such as Anxiety, **Depression** or another **mental illness**: may explain the student's inability to pay attention.

Other **Medical conditions**: may create pain or discomfort or may affect cortical processing and create learning difficulties.

XIII Documenting Learning Disabilities

Insight

Documenting Learning Disabilities

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GUIDELINES FOR DOCUMENTATION OF A SPECIFIC LEARNING DISABILITY

In most circumstances learning disabled students requesting accommodations must provide complete documentation of their disability. The following guidelines describe the necessary components of documentation from a qualified, licensed professional.

To be afforded reasonable academic accommodations, the student must document that the disability creates a significant *current functional* impact on academic performance. It should reveal steps the student can take to learn more effectively and reasonable accommodations that

might be helpful. **While these guidelines provide general information, students and their parents should contact the educational institution for specific requirements.**

The documentation report should include:

1. Qualifications of the Evaluator

Professionals conducting assessments, diagnosing learning disorders, and making recommendations for accommodations must have comprehensive training and direct experience with the age-appropriate population being evaluated.

The following professionals are generally considered qualified to evaluate specific learning disabilities provided that they have additional training and experience in the assessment of learning problems specific to the population: clinical or educational psychologists, school psychologists, neuropsychologists, medical doctors, and other professionals.

2. Documentation

Documentation should validate the need for services based on the student's current level of functioning in an educational setting. Usually, the student's Individualized Education Program (IEP) and/or 504 Plan are insufficient documentation although it does help to establish an ongoing need for academic support services.

Testing involves a comprehensive psychoeducational or neuropsychological evaluation and includes: a diagnostic interview (academic and family history), assessment of aptitude (IQ), academic achievement and information processing (modality and processing speed), and memory. Other instruments may be used to rule out emotional and/or other possible causes of the learning problem. The report

should include standard scores, percentiles, and a clinical summary. It should make specific recommendations for accommodations and explain why each accommodation is necessary. The summary should identify a specific learning disorder and specify the criteria for diagnosis. Terms such as "learning differences" or "test difficulty or anxiety" are not the equivalent of a diagnosed learning disability. Since learning disorders are evident early academically, a thorough history is critical to documenting the student's difficulty.

Assessment should be based on a comprehensive battery that does not rely on any one test or subtest. The professional judgment of an evaluator in choosing tests is important. The following list is intended as a helpful resource

Aptitude Testing (Intelligence Testing) instruments that are usually acceptable include:

- The Wechsler Intelligence Scale (appropriate for the individual's age) with subtest scores.

- The Woodcock-Johnson, Psychoeducational Battery Revised: Tests of Cognitive Ability

 - The Kaufman Adolescent and Adult Intelligence Test

 - The Stanford-Binet Intelligence Scale (4th edition)

Achievement Testing

- Woodcock-Johnson Psychoeducational Battery Revised: Tests of Achievement

 - Stanford Test of Academic Skills

Wechsler Individual Achievement Test (WIAT)
Scholastic Abilities Test for Adults (SATA)

or specific achievement tests such as:

Nelson-Denny Reading Skills Test
Stanford Diagnostic Mathematics Test
Test of Written Language 3 (TOWL-3)
Woodcock Reading Mastery Tests Revised

Note: The Wide Range Achievement Test 3 (WRAT-3) is not usually considered a comprehensive measure of achievement and, therefore, is not useful if used as the sole measure of achievement.

Information Processing

Specific areas of information processing may be assessed including short and long-term memory, sequential memory, visual and auditory perception/processing, or processing speed. Acceptable instruments include the Detroit Tests of Learning Aptitude 3 (DTLA-3), the Detroit Test of Learning Aptitude Adult (DTLA-A), and information subtests on the WAIS-R.

The testing instruments should provide information for the diagnostic summary and allow for the evaluator to:

*Rule out alternative explanations for (1) academic problems such as poor education, poor motivation and/or poor study skills, (2) emotional problems, such as anxiety and depression, (3) attentional problems and (4) cultural/language differences.

*Indicate how patterns in the student's cognitive ability, achievement and information processing reflect the presence of a learning disability, and the degree it affects the individual in the learning context for which accommodations are being requested.

*Recommend specific accommodations and indicate why specific accommodations are needed, and how these accommodations will ameliorate the effects of the disability.

*Explain the academic history including a record of prior accommodation or auxiliary aids, and specific conditions where the accommodations were used (e.g., standardized testing, final exams, etc.). Reasonable accommodations may differ depending on the level of education and the specific institution.